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**Hawaii Agricultural Experiment Station,
HONOLULU.**

J. G. SMITH, SPECIAL AGENT IN CHARGE.

PRESS BULLETIN No. 14.

FULLER'S ROSE BEETLE

(*Aramigus fulleri* Horn.)

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Department of Agriculture.

Fuller's rose beetle is the common name of an injurious beetle known in the Hawaiian Islands as the "Maui" or "Olinda beetle." It is referred to on the Island of Maui as the "Olinda bug" and in one district on the Island of Hawaii as the "wire-fence bug" because of its occurrence on the strands of wire in immense numbers. The insects had collected on the fence from the neighboring guava, Hilo grass and "oi" and were using the wires, the writer infers, as an easy means of migration since they are incapable of flight. The insect was first described by Dr. Geo. H. Horn in 1876 under the name *Aramigus fulleri* from specimens referred to him by Mr. A. S. Fuller. The specimens were from Montana and Dr. Horn records the species as occurring from New Jersey to Montana at that time.¹

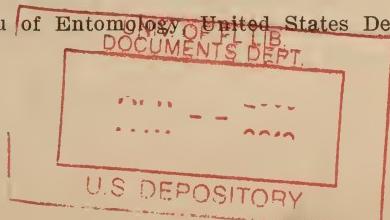
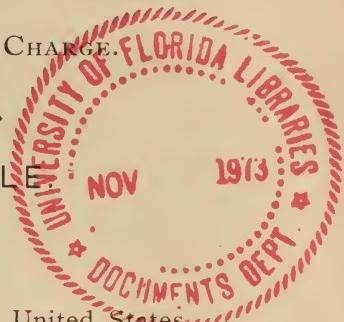
Mr. F. H. Chittenden describes the adult beetle as follows:

It measures from a quarter to nearly three-eighths of an inch in length, and is of the form shown in figure at c and d. (See figure 1.) The snout is quite short and scarred at the sides of the mandibles (jaws). The head is white, and the abdomen is ovoid. The color is dark dirty brown, and the entire body, including the legs, is lightly covered with gray or pale-brown scales. On each side of the elytra (wing covers) there is a whitish diagonal line.²

In the figure are shown, besides the views of the adult, the

¹The Rhynchophora of America North of Mexico. Pro. Am. Phil. Soc. Vol. XV. 1876, pp. 94, 95.

²Bulletin 27 (n. s.), Bureau of Entomology, United States Department of Agriculture, 1901.



appearance of the eggs at *c*, the larva or young at *a* and the pupa at *b*.

LIFE HISTORY.

Dr. C. V. Riley in his report as entomologist of the United States Department of Agriculture for 1878 says in regard to the life-cycle of this beetle:

The parent beetles, like most other snout-beetles, live for a considerable time, as I have kept them in confinement for nearly three months. They are nocturnal in habit, being quite active and feeding only after dusk. They shun the light during day-time and hide under the leaves or cling tightly to the branches or in some fork near the base of the plant, always in such position as not easily to be observed. They drop to the ground, draw up their legs, and "play 'possum," remaining motionless for some time and looking very much like a small lump of dry earth, the color adding greatly to the resemblance. This habit of simulating death upon disturbance is common to many other insects of this family. They feed upon the leaves, but do more injury by severing them than by the amount of foliage consumed.

The eggs are laid in flattened batches consisting of several contiguous rows and each batch containing from 10 to 60. The individual egg is smooth, yellow, ovoid, and about 1 mm. in length. The female shows a confirmed habit of secreting her eggs, which are thrust between the loose bark and the stem, especially at the base just above the ground. In the 20-odd batches which I have examined they have invariably been thrust either between the loose bark as above described, or into any other crevice that could be found; as, for instance, that formed by some loose paper around the edge of the bell-glass in which some of my experiments were made. More rarely they are laid between the earth and the main stem just at the surface of the ground. The eggs are so firmly glued together and to the place of deposit that they are not easily seen and are with extreme difficulty detached.

These eggs require about a month to hatch, and the new-born larva, which is of a pale yellowish color, with light brown mouth-parts, is quite active, and immediately burrows into the ground, and acquires very soon after a bluish hue. Just how long this larva requires to attain full growth I have not been able to ascertain, but, in all probability, it remains at least one month, and probably several more, in the ground, where the pupa state is finally assumed.³

Prof. Koebele in his "Notes on the Insects Affecting the Koa

³Report of the Entomologist, Annual Report of the Commissioner of Agriculture for the year 1878, United States Department of Agriculture, Washington, 1879.

Trees at Haiku Forest on Maui" says in regard to the life-cycle:

We have found its larvae under stones at Olinda, four years since, and collected large numbers of the same in all stages on this trip, feeding on the roots of Hilo grass. We have obtained its eggs in confinement, deposited in clusters of some seventy-five, of a light yellow color from three-fourths to one mm. long and half as wide. At the office we find that large numbers of young larvae issue from galls produced by the Tortricid larvae. Here the eggs are inserted anywhere conveniently where a hole is present, and are imbedded in irregular masses, partly covered by excremental remains. We should think that they are also found under the bark of trees where the beetles feed.⁴

OCCURRENCE IN THE UNITED STATES.

Mr. Chittenden in his article above referred to says that—

Prior to the year 1874 this species does not appear to have been recognized; in short, its technical description was not published until the Centennial year. At about that time and soon afterwards, as well as at intervals later, it has attracted considerable attention on account of its ravages on roses, camellias, geraniums, and other ornamental plants in different portions of the country, particularly in the Eastern States, and more especially in New Jersey, New York, and Massachusetts. During the last two years this species has been troublesome to roses and carnations, especially in portions of New York and Wisconsin, and in lemon groves in California as well as in Hawaii.

This insect is destructive in both of its active stages, doing most damage as a larva, when it lives in the soil and feeds upon the roots of its food plants, the beetle practically confining itself to the foliage, flowers, and buds of the plants which it attacks. Although preeminently a greenhouse pest in California, particularly in the southern portion, groves of orange and lemon as well as other trees sometimes suffer much injury.

Recently the beetle has been recorded as seriously injuring strawberries in the field in Southern California. Mr. Fdk. Maskew of Long Beach, Cal., in notes on the insect during the season of 1904,⁵ records it as injurious to strawberries, blackberries and logan berries, as well as various ornamental plants and apples. The injury was accomplished by the larvæ feeding

⁴Report of the Commissioner of Agriculture and Forestry, Territory of Hawaii, for the year ending December 31, 1900, Honolulu, 1901. pp 63, 64.

⁵Bulletin 54, Bureau of Entomology, U. S. Department of Agriculture, 1905, pp. 70, 71.

beneath the surface of the soil, with the exception that the foliage of certain of the plants, and the apple itself, were attacked by the beetle. The apples were injured by the adult eating through the stem, causing the immature fruit to fall. In regard to the life-history of the insect, Mr. Maskew says: "August 19 a beetle was observed in the act of ovipositing. The eggs, 26 in number, were laid in an irregular mass upon the upper surface of the foliage of a crested wattle (*Albizzia lophantha*), a potted plant. The foliage was about 5 feet above the ground, and above the egg mass it was drawn together and fastened by a webby substance. These eggs, placed in a phial and carried in the pocket, hatched August 24. Many egg masses were subsequently found and hatched out."

OCCURRENCE IN HAWAII.

Fuller's rose beetle is first recorded from the Islands by Prof. A. Koebele, who mentions the insect as an undetermined species in his report to the Provisional Government of the Hawaiian Islands in 1894. He writes:

On the Island of Maui a snout-beetle, *Otiorhynchid*, is eating the leaves of many plants, shrubs and trees. I would recommend to spray the affected plants with Paris green, in the proportion of one pound of this to about two hundred gallons of water. A little soap added to the solution will keep the poison on the foliage a much longer time.⁶

Mr. R. C. L. Perkins describes the beetle as a new species in *Fauna Hawaiensis* under the name *Pantomorus olindae*.⁷ Mr. Perkins says in regard to its distribution: "This species is found in Honolulu, and is sometimes very abundant at Makawao and Olinda, Maui, and is found as high up as 5,000 ft. on Haleakala."

Concerning its occurrence in Hawaii, Mr. Chittenden has the following:

During February, 1901, we received specimens of this species from Mr. Albert Koebele, at present stationed at Honolulu, H. I., with notes

⁶Report of Entomologist, Biennial Rep. of the Minister of the Int., Prov. Govt. of the Haw. Isl. 1894, p. 101.

⁷*Fauna Hawaiensis*, Vol. II, Part III, 1900, pp. 130, 131.

upon its habits. These specimens have been compared with authentically determined *Aramigus fulleri* by the writer, as well as by Mr. Schwarz and Mr. Charles Fuchs, and there is no doubt of their identity. It seems that the species is known in Hawaii as the Olinda bug, and has been described by Mr. R. C. L. Perkins as *Pandamorus olindae*. Some notes are furnished by Mr. Koebele, which bear upon the insect's life economy. Its presence has been frequently noticed upon trees as well as upon Hilo grass. Many trees of Java plum recently planted have been seen by Mr. Koebele with every leaf eaten off, and some have died from the effects of the beetle and Hilo grass combined. The insect appears to be most numerous along the border of forests, and is found from the seashore as high up as 5,000 feet elevation. Seven years prior to the date of writing the beetle was seen from Paia, where it was destructive to roses and garden plants generally. Our correspondent believes that it must have been present on the Islands long before it became prominent as a pest, and he as well as Mr. Schwarz, the writer, and some others are inclined to the belief that it is an introduction from Mexico—Mr. Koebele believes probably from Acapulco, but does not state reasons.

Larvae have been found under stones, and in large numbers, also, in galls produced by Tortricidae.

In a list of the injurious and beneficial insects of the Hawaiian Islands, Mr. Perkins records the beetle with the following note:

Introduced within the last twenty years probably, since it was not obtained by Mr. Blackburn, who collected at Olinda. It is well known on Maui as the Olinda bug and in the United States as "Fuller's rose-beetle." It is injurious to the koa and other trees and plants on Maui. It has of late years been carried to Hawaii, where in certain localities it rivals the Japanese beetle in consumption of foliage. It has no natural enemies in this country.⁸

The writer in his report for 1904 records this beetle as an injurious species affecting corn on the Island of Maui and Irish potatoes and sugar cane on the Island of Hawaii, and as a serious pest of horticultural plants generally.⁹

STATION RECORDS.

During July, 1902, this beetle was collected by the writer at Makawao, Island of Maui, from newly planted forest trees. It

⁸Report of the Governor of the Territory of Hawaii, 1902, p. 32.

⁹Annual Report of the Hawaii Agricultural Experiment Station, 1904, Annual Report of the Office of Experiment Stations, United States Department of Agriculture, Washington, 1905, pp. 375 and 377.

had entirely denuded imported beech, birch, ash and maple trees of their foliage and these trees subsequently died.

In August, 1903, the beetle was received from Kamuela (Waimea), Island of Hawaii, and reported as extremely injurious to red-gum, blue-gum, Java plum, Acacias and Ohia.

On August 27, 1903, specimens were received from Makawao, Maui, and reported as feeding upon trees and shrubs in dooryards and corn in the field.

In November of the same year the writer observed the species in the Kohala District, Island of Hawaii, feeding upon Ohia in the Kohala forest and upon Irish potatoes, Alligator pear (*Persia gratissima*), iron-wood (*Casurina* sp.), Monterey cypress and blue-gum in the Kohala homestead lands.

During December, 1903, it was observed by the writer in the Hamakua District, Island of Hawaii, at Kukuihaele and Honokaa on sugar cane and was very abundant, likewise, on the "oi" (*Verbena* sp.) and guava bordering the cane fields, from which plants it undoubtedly invaded the fields.

This last year the beetle has been received from Puuwaawaa, Kona, Island of Hawaii, where it was injuring Citrus trees, and from Pohakea, District of Hamakua, where it was noticed for the first time. The specimens in the latter place were collected from guava. It has also been reported from Pahala, Kau, and Tantalus, Island of Oahu.

NATURAL ENEMIES.

Prof. J. H. Comstock in his report as Entomologist of the United States Department of Agriculture for 1879 says: "A wire-worm or click-beetle larva was found preying upon the larvae of this beetle in our breeding cages. We did not succeed in rearing the larva to the perfect state, but believe it to be the larva of *Drasterius amabilis* Lec."¹⁰

Mr. Chittenden says under this head:

Toads are frequently found in greenhouses, and sometimes are pur-

¹⁰Report of the Commissioner of Agriculture, U. S. Department of Agriculture, for the year 1879, Washington, 1880, p. 251.

posedly put in such places to prey upon destructive insects. They are known to feed upon insects related to this rose beetle, and probably feed upon the species in question.

Prof. Koebele in his report on Koa insects above referred to says:

The indigenous Carabid beetles on higher elevations must destroy many of the larvae.

Insectivorous birds evidently feed largely upon the beetles. We found excrements of the mynah bird consisting entirely of the remains of these beetles. Quails are considered as excellent birds to destroy such insects. Fowls should keep the surroundings of houses free of them. Probably some 90 per cent. of the food of the mongoose consists of insects, roaches, crickets, grasshoppers and centipedes, and, from examination made, he also feeds upon the "Olinda bug."

REMEDIES.

Since the larvae in feeding on the roots of the plants beneath the surface of the soil, are equally and sometimes more destructive than the beetles in feeding on the foliage, the soil about infested plants should be treated with carbon bisulphide. The fumes of this substance are very penetrating and very poisonous. It is, likewise, very explosive and no fire of any sort, such as a lighted cigar, for example, should be allowed in the vicinity while using it. The soil is treated by first making several holes about the plant in the loose soil with a sharp round stick (a sharpened broom-handle will do nicely) and then pouring into each hole about one-half ounce of the carbon bisulphide and stopping the hole immediately with some earth, packing it down firmly with the foot. Fortunately the adult beetle has not the power of flight. For this reason, trees and ornamental plants can be protected by first picking the beetles from the plants and dropping them into a bucket of water having coal-oil on the surface, or by jarring the beetles from the plants, and then wrapping the stem or trunk with cotton bands over which it will be difficult for the insects to crawl. In greenhouses, where the greatest injury is done by this beetle on the Mainland, the insect is controlled by picking the adults from the plants, or treating the roots of infested plants with carbon bisulphide, applied by means of a metal syringe, and "the use of tobacco waste in lib-



eral quantities about the roots of the plants is advisable, as it acts both as an insecticide and a fertilizer."

For this and other leaf-feeding insects the writer has been recommending spraying the foliage with Arsenate of Lead. The advantages of this poison over Paris green are that it can be used in liberal quantities without damaging the foliage; that it is white in color and thus is easily seen, making even spraying possible; and that it is quite adhesive, not being easily washed away by the frequent rains. Full directions for making and applying this insecticide are given in Bulletin No. 3 of this Station. Those who do not care to prepare the home-made mixture can obtain an Arsenate of Lead in paste form ready for immediate use, on the market in Honolulu. This manufactured product has been tested and found entirely satisfactory.

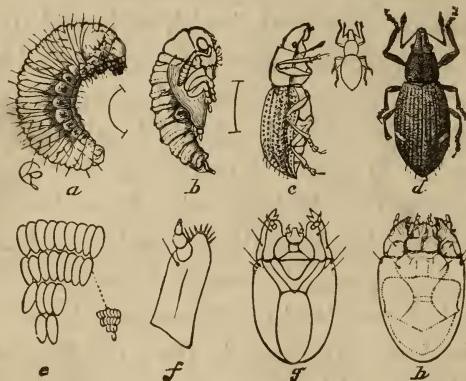


Fig. 1.—Fuller's rose beetle, *Aramigus fulleri* :—a, larva; b, pupa; c, outline of side view of adult; d, same, upper or dorsal view, the small outline between showing natural size; e, eggs, enlarged and natural size; f, g and h, views of head of larvae, enlarged. (from Riley.)

HONOLULU, T. H., October 19, 1905.